

E 1.28: SOLAR - 1/2018 - 79 / 05

SOLAR/2018-79/05

Alpha 1214332

Monthly Performance Report

REEDY CREEK UTILITIES

MAY 1979



U.S. Department of Energy

National Solar Heating and
Cooling Demonstration Program

National Solar Data Program

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, make any warranty, express or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

MONTHLY PERFORMANCE REPORT
REEDY CREEK UTILITIES
MAY 1979

I. SYSTEM DESCRIPTION

The Reedy Creek site is a two story, 6,100 square foot concrete block office building located in Lake Buena Vista, Florida. The solar energy system is designed to provide space heating, domestic hot water and space cooling.

The collector subsystem is composed of a horizontal array of 16 parabolic trough collectors, manufactured by AAI Corporation, with tracking absorber tubes. The collector array is an integral part of the building's roof, with the reflector troughs oriented so that each major axis is in an east-west direction. The 16 absorber tubes are moved in unison in a north-south direction by the solar tracking system. The total collector aperture area is 3,840 square feet. Water is used as the heat collection, transfer, and storage medium. Collected solar energy is stored in a 10,000-gallon hot water tank, located adjacent to the building and shaded by the roof. Domestic hot water is provided by a heat exchanger immersed in this tank. Space heating is provided by circulation of hot water from the storage tank through heat exchangers located in the central air distribution system. No auxiliary energy is provided for either domestic hot water or space heating.

A 25-ton absorption chiller utilizes hot water from solar storage to provide chilled water to a 10,000-gallon cold water storage tank. For space cooling, water from this cold tank is circulated through heat exchangers located in the building's central air distribution system. Auxiliary cooling is provided by supplemental cold water from the utility district's central chiller plant, which is powered by fossil fuels.

The system, shown schematically in Figure 1, has five modes of solar operation.

Mode 1 - Collector-to-Storage: This mode is entered when the collector absorber plate temperature is 10°F higher than the temperature at the bottom of the hot storage tank (water solar thermal storage). Water is circulated through the collector array-storage loop by pump P1 until the temperature of the water at the bottom of storage rises to within 3°F of that of the collector absorber plate.

Mode 2 - Storage-to-Space Heating: This mode is entered when the temperature falls below the setting of the thermostats located in the occupied areas. Since this is the only means of space heating available, no minimum tank temperature is specified. Pump P2 causes hot water to flow directly from the storage tank to the heat exchanger in the air-handling unit, and back to the storage tank.

Mode 3 - Domestic Hot Water Heating: Domestic hot water (DHW) is provided by passing city supply water through a heat exchanger immersed in the solar thermal storage tank. No conventional water heater exists, thus water is heated only upon demand. A tempering valve is used when necessary to reduce the temperature of water leaving the heat exchanger. If the water is too hot, cold supply water is mixed with it in the tempering valve before going to the DHW line.

Mode 4 - Chilled Water Production: This mode is entered when the temperature of the water in the top of the solar thermal storage tank is at or above the generator operating temperature (nominally 180°F) and that of the water at the bottom of the 10,000-gallon chilled water storage is greater than 45°F. Hot water is drawn from the solar thermal storage tank to operate the generator section of the absorption chiller and cold water is circulated through the chiller from the chilled water storage. Energy is removed from the cold water, lowering its temperature; the energy is rejected through the cooling tower, and the cold water returns to the chilled water storage tank. Whenever the temperature

of the water going to the generator exceeds the upper limit of 195°F, the water is tempered with cooler water returning through valve V4.

Mode 5 - Space Cooling: The space cooling mode is initiated when the building temperature exceeds the setting of the conditioned space thermostat. Chilled water from the chilled water storage is then circulated by pump P6 to the heat exchangers in the building air distribution system. If the chilled water storage system is not able to meet the cooling load, an auxiliary chilled water supply is available from the central energy plant.

II. PERFORMANCE EVALUATION

The system performance evaluations discussed in this section are based primarily on the analysis of the data presented in the attached computer-generated monthly report. This attached report consists of daily site thermal and energy values for each subsystem, plus environmental data. The performance factors discussed in this report are based upon the definitions contained in NBSIR 76-1137, Thermal Data Requirements and Performance Evaluation Procedures for the National Solar Heating and Cooling Demonstration Program.

A. Introduction

The Reedy Creek solar energy system operated continuously throughout the month of May. The DHW demand was 0.19 million Btu, there was no space heating demand, and the space cooling demand was 14.02 million Btu. The solar energy system supplied 100 percent of the DHW requirement, and 58 percent of the space cooling requirements - these quantities are reported in the attached computer printout as loads.

B. Weather

For May, the average outside ambient temperature measured at the site was 77°F. The long-term average temperature is also 77°F at the Orlando weather station. The average measured insolation in the plane of the array was only 1,722 Btu/ft²-day. This is considerably less than the long-term average of 1,988 Btu/ft²-day for May, which was derived from measurements also taken at the Orlando weather station.

C. System Thermal Performance

Collector - Of the 204.95 million Btu incident on the collector array, 25.39 million Btu were collected and delivered to the solar thermal storage tank. This represents an array efficiency of 12.4 percent. Operating energy of 1.35 million Btu (396 kwh) was required to collect and store this solar energy.

Storage - Of the 25.39 million Btu delivered to storage, 17.79 million Btu were subsequently removed for use within the system. Temperature probes within the solar thermal storage tank indicate that the internal energy of the water increased by 0.37 million Btu during the month. This indicates a resulting loss to the environment of 7.23 million Btu through the tank insulation. A further discussion of the tank insulation heat transfer is contained in Section II-D, Observations.

Domestic Hot Water - Domestic hot water is provided to the building by passing city water through a heat exchanger that is immersed in the solar thermal storage tank. A total of 376 gallons of water at an average temperature of 128°F were supplied by this system during May. The average temperature increase was 58°F, which resulted in a measured demand of 0.19 million Btu. All of this energy was supplied by the solar energy system. There was no operating energy required.

Space Heating - No space heating was required during the month of May.

Absorption Chiller - The absorption chiller operated on 14 occasions to reduce the chilled water storage temperature during May. A total of 2.35 million Btu of electrical energy from the auxiliary conventional cooling system was required to assist the absorption chiller to meet the cooling load on 20 days of the month. The absorption chiller utilized 17.60 million Btu from the solar thermal storage tank to remove 7.21 million Btu from the chilled water storage (see attached Auxiliary Performance data). The resulting coefficient of performance (COP) of 0.504 is slightly less than that experienced last month, but very near the average of the past 10 months.

Chilled Water Storage - Performance of the chilled water storage (see attached Auxiliary Storage Performance data) shows that 7.21 million Btu were removed by the chiller, 8.15 million Btu were added from the conditioned space during cooling, and the internal energy of the chilled water storage decreased by 0.36 million Btu. This implies that 1.27 million Btu were lost from the water to the ambient environment through the insulation.

Space Cooling - Space cooling was required on all of the working days of the month. The space cooling load was 14.02 million Btu. Water from the chilled water storage was pumped through the air duct heat exchangers to remove 8.15 million Btu from the air. Chilled water from the central plant was required to assist in supporting the cooling load during all but three of the days of the month when space cooling was required. This resulted in a space cooling solar fraction of 58 percent for the month of May.

D. Observations

The absorption chiller COP was slightly down from the exceptionally high value experienced in April. This can be attributable to the more typical insolation experienced in May. The sky was exceptionally clean in April,

resulting in more direct and less diffuse solar energy. The collectors at Reedy Creek primarily collect direct solar radiation and, therefore, were able to supply the absorption chiller with higher temperature water in April. Cloud cover increased in May to a more typical level, and this in turn, slightly reduced the generator inlet temperature of the absorption chiller, which slightly reduced the COP. It should be noted that the average daily temperatures shown in the tables will not necessarily indicate the decreased temperature when averaged over a 24-hour period. This is because the chillers can rapidly lower the storage tank temperature when it is operated.

Losses from the hot water storage tank were less than the previous month but similar to what has been observed over the past eight months. This rate of loss of thermal energy appears to be large when compared to other solar energy systems, but typical for the Reedy Creek Facility.

Instrumentation indicates a loss of 1.27 million Btu to the environment from the chilled water storage tank. This occurred while the average tank temperature was below the ambient temperature. This phenomenon cannot actually occur, but has been indicated on several occasions in the past. It is most likely due to thermal stratification within the tank and to small temperature changes which are less than the accuracy of the instrumentation. Investigations will be made in an attempt to determine the accuracy of several temperature sensors, to improve them if possible.

E. Energy Savings

A total electrical energy savings of 0.37 million Btu (108 kwh) was realized. This value assumes that, had there not been a solar energy system, the energy requirements would have been met by an electrical hot water heater and by a conventional electrical heat pump.

III. ACTION STATUS

The accuracy of the several temperature sensors in the space cooling system are being investigated.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979
SOLAR/2018-79/05

SITE/SYSTEM DESCRIPTION: THE REEDY CREEK SITE IS A 6100 SQ. FT. CONCRETE BLOCK OFFICE BUILDING. THE LIQUID SYSTEM EMPLOYS 3840 SQ. FT. OF PARABOLIC TROUGH COLLECTORS WHICH FORM AN INTEGRAL PART OF THE ROOF. THE SYSTEM IS DESIGNED TO PROVIDE SPACE HEATING, COOLING, AND DOMESTIC HOT WATER. STORAGE CYCLE CHILLER PROVIDES GALLONS OF BOTH HOT AND COLD WATER. AN ABSORPTION AND A COIL SUBMERGED IN COOLING, A RADIANT TANK PROVIDES HOT WATER. AUXILIARY COOLING IS PROVIDED BY THE HOT STORAGE TANK. CHILLED WATER FROM THE CENTRAL COOLING PLANT. THERE IS NO AUXILIARY DHW OR HEATING.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	204.946	MILLION BTU
COLLECTED SOLAR ENERGY	53371	BTU/SQ. FT.
AVERAGE AMBIENT TEMPERATURE	25.391	MILLION BTU
AVERAGE BUILDING TEMPERATURE	6612	BTU/SQ. FT.
EXCESS SOLAR CONVERSION EFFICIENCY	77	DEGREES F
EXCESS OPERATING ENERGY	76	DEGREES F
TOTAL SYSTEM OPERATING ENERGY	0.09	MILLION BTU
TOTAL ENERGY CONSUMED	1.347	MILLION BTU
	4.983	MILLION BTU
	32.724	MILLION BTU

SUBSYSTEM SUMMARY:

LOAD	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
SOLAR FRACTION USED	0.187	0.000	14.024	14.211
OPERATING ENERGY	0.187	0.000	58	59
AUX. THERMAL ENERGY	N.A.	0.000	17.602	17.789
AUX. ELECTRIC FUEL	N.A.	N.A.	3.636	4.983
AUX. FOSSIL FUEL	N.A.	N.A.	5.876	5.876
ELECTRICAL SAVINGS	N.A.	N.A.	2.350	2.350
FOSSIL SAVINGS	0.187	0.000	N.A.	N.A.
	N.A.	N.A.	1.530	0.370
			N.A.	N.A.
			N.A.	N.A.

SYSTEM PERFORMANCE FACTOR:

0.582

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SITE SUMMARY

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

SITE/SYSTEM DESCRIPTION: IS A 6100 SQ. FT. OF PARABOLIC TROUGH COLLECTOR BUILDING. THE REEDY CREEK SITE EMPLOYS 3840 SQ. FT. OF PARABOLIC TROUGH COLLECTOR BUILDING. WHICH FORM AN INTEGRAL PART OF THE ROOF. THE SYSTEM IS DESIGNED TO PROVIDE SPACE HEATING, COOLING, AND DOMESTIC HOT WATER. STORAGE CONSISTS OF 10,000 GALLONS OF BOTH HOT AND COLD WATER. AN ABSORPTION CYCLE CHILLER PROVIDES COOLING. A RADIANT HOT WATER COIL PROVIDES HEATING AND A COIL SUBMERGED IN THE HOT STORAGE TANK PROVIDES HOT WATER. AUXILIARY COOLING IS PROVIDED BY CHILLED WATER FROM THE CENTRAL COOLING PLANT. THERE IS NO AUXILIARY DHW OR HEATING.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY 216.218 GIGA JOULES
COLLECTED SOLAR ENERGY 606085 KJ/SQ. M. 606085 GIGA JOULES
AVERAGE AMBIENT TEMPERATURE 26.787 KJ/SQ. M. 26.787 GIGA JOULES
AVERAGE BUILDING TEMPERATURE 75088 DEGREES C 75088 GIGA JOULES
ECSS SOLAR CONVERSION EFFICIENCY 25 25 DEGREES C
ECSS OPERATING ENERGY 24 24 DEGREES C
TOTAL SYSTEM OPERATING ENERGY 0.09 GIGA JOULES
TOTAL ENERGY CONSUMED 1.422 GIGA JOULES
5.257 GIGA JOULES
34.524 GIGA JOULES

SUBSYSTEM SUMMARY:

LOAD	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
SOLAR FRACTION USED	0.198	0.000	14.795	14.993
OPERATING ENERGY	0.198	0.000	58	59
AUX. THERMAL ENG	N.A.	0.000	18.570	18.768
AUX. ELECTRIC FUEL	N.A.	N.A.	3.836	5.257
AUX. FOSSIL FUEL	N.A.	N.A.	6.199	6.199
ELECTRICAL SAVINGS	N.A.	N.A.	2.480	2.480
FOSSIL SAVINGS	0.198	0.000	N.A.	N.A.
	N.A.	N.A.	1.614	0.390
			N.A.	N.A.
			N.A.	N.A.

SYSTEM PERFORMANCE FACTOR:

0.582

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT
OF THE NATIONAL SOLAR DATA PROGRAM, FEBRUARY 28, 1978,
SOLAR/0004-78/1a

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SOLAR/2018-79/05

SITE: REEDY CPFEK
REPORT PERIOD: MAY, 1979

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	5.016	73	0.005	NOT	0.027	NOT	0.001
2	3.443	73	0.007	APPLICABLE	0.004		0.002
3	7.384	78	0.006		0.051		0.001
4	7.633	80	1.728		0.057		0.226
5	7.207	79	0.001		0.051		0.000
6	5.097	78	0.832		0.031		0.163
7	1.270	73	0.007		0.000		0.007
8	0.176	74	0.007		0.000		0.038
9	4.527	75	0.007		0.011		0.001
10	7.228	80	0.009		0.052		0.001
11	7.747	79	1.159		0.049		0.172
12	7.489	80	0.000		0.061		0.000
13	7.798	80	1.523		0.013		0.195
14	4.099	75	0.008		0.047		0.002
15	8.864	77	0.011		0.061		0.190
16	8.332	76	1.585		0.050		0.001
17	7.590	75	0.008		0.060		0.165
18	8.342	72	1.376		0.068		0.133
19	9.251	74	1.234		0.043		0.000
20	7.333	75	0.000		0.043		0.148
21	6.533	78	0.969		0.061		0.111
22	8.214	81	0.017		0.047		0.001
23	7.169	80	0.008		0.000		0.003
24	2.410	73	0.008		0.061		0.145
25	8.662	74	1.256		0.066		0.131
26	9.605	69	0.002		0.057		0.000
27	8.519	74	0.000		0.059		0.000
28	8.926	78	0.000		0.046		0.326
29	7.022	79	2.290		0.053		0.116
30	7.115	79	0.822		0.052		0.094
31	7.943	83	0.748				
SUM	204.946	-	17.789	N.A.	1.347	N.A.	-
AVG	6.611	77	0.574	N.A.	0.043	N.A.	0.087
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT COLLECTOR ARRAY PERFORMANCE

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979
SOLAR/2018-79/05

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	5.016	2.850	0.533	77	0.106
2	3.443	0.453	0.002	78	0.001
3	7.384	5.012	0.906	87	0.123
4	7.633	5.594	1.199	88	0.157
5	7.207	5.319	0.987	88	0.137
6	5.097	3.011	0.394	89	0.077
7	1.276	0.000	0.000	74	0.000
8	0.176	0.000	0.000	76	0.000
9	4.527	0.840	0.106	85	0.023
10	7.228	5.630	1.129	90	0.156
11	6.747	4.716	0.837	88	0.123
12	7.489	5.026	0.923	90	0.123
13	7.799	6.087	1.129	90	0.145
14	4.064	1.268	0.163	84	0.040
15	6.864	4.736	0.945	85	0.138
16	8.332	6.162	1.199	86	0.144
17	7.342	4.968	1.009	82	0.107
18	8.342	5.884	1.203	84	0.134
19	7.251	4.085	1.593	82	0.172
20	7.336	4.777	0.808	86	0.110
21	6.533	4.450	0.644	88	0.099
22	8.214	6.114	1.156	90	0.141
23	7.169	4.522	0.801	88	0.112
24	2.410	0.000	0.000	88	0.000
25	8.662	5.978	1.072	74	0.124
26	9.605	7.139	1.554	76	0.162
27	8.519	5.813	1.040	85	0.122
28	8.926	6.167	1.843	88	0.133
29	7.022	4.982	0.863	90	0.123
30	7.115	5.522	1.240	93	0.174
31	7.943	5.219	1.055	92	0.133
SUM	204.946	135.324	25.391	-	-
AVG	6.611	4.365	0.819	85	0.124
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979
SOLAR/2018-79/05

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORAGE ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.533	0.005	0.398	160	0.757
2	0.002	0.007	-0.262	161	-143.137
3	0.906	0.006	0.743	165	0.827
4	1.199	1.728	-0.701	166	0.857
5	0.987	0.001	0.753	165	0.764
6	0.394	0.832	-0.638	167	0.492
7	0.000	0.009	-0.283	160	1.000
8	0.106	0.007	-0.126	156	1.000
9	1.129	0.009	0.975	154	-1.131
10	0.837	1.159	-0.450	160	0.847
11	0.923	0.000	0.649	165	0.703
12	1.129	1.523	-0.544	166	0.867
13	0.163	0.008	-0.126	166	-0.722
14	0.945	0.011	0.722	165	0.776
15	1.199	1.585	-0.691	166	0.746
16	0.809	0.008	0.482	164	0.605
17	1.120	1.376	-0.503	164	0.780
18	1.593	1.234	0.031	161	0.795
19	0.808	0.000	0.565	164	0.700
20	0.644	0.969	-0.534	165	0.675
21	1.156	0.913	0.084	163	0.862
22	0.801	0.007	0.481	165	0.611
23	0.000	0.008	-0.314	166	1.000
24	0.072	1.259	-0.325	164	0.869
25	1.554	1.259	0.010	162	0.803
26	1.040	0.002	0.785	165	0.757
27	1.184	0.000	0.017	176	0.775
28	0.863	2.290	-1.649	169	0.742
29	1.240	0.822	0.136	163	0.773
30	1.055	0.748	0.042	163	0.749
31					
SUM	25.391	17.789	0.367	-	-
AVG	0.819	0.574	0.012	164	0.715
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT HOT WATER SUBSYSTEM

SOLAR/2018-79/05

SITE: PHEOY CREEK
REPORT PERIOD: MAY, 1979

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR. OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENRGY SAVINGS MILLION BTU	FOSSIL ENRGY SAVINGS MILLION BTU	SUP. WAT. TEMP. DEG F	HOT WAT. TEMP. DEG F	HOT WATER USED GAL	
1	0.005	100	0.005	NOT APPLICABLE				0.005	NOT APPLICABLE				13
2	0.007	100	0.007	NOT APPLICABLE				0.007	NOT APPLICABLE				13
3	0.006	100	0.006	NOT APPLICABLE				0.006	NOT APPLICABLE				11
4	0.014	100	0.014	NOT APPLICABLE				0.014	NOT APPLICABLE				25
5	0.001	100	0.001	NOT APPLICABLE				0.001	NOT APPLICABLE				2
6	0.009	100	0.009	NOT APPLICABLE				0.009	NOT APPLICABLE				0
7	0.007	100	0.007	NOT APPLICABLE				0.007	NOT APPLICABLE				20
8	0.007	100	0.007	NOT APPLICABLE				0.007	NOT APPLICABLE				15
9	0.009	100	0.009	NOT APPLICABLE				0.009	NOT APPLICABLE				15
10	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				0
11	0.008	100	0.008	NOT APPLICABLE				0.008	NOT APPLICABLE				15
12	0.015	100	0.015	NOT APPLICABLE				0.015	NOT APPLICABLE				12
13	0.008	100	0.008	NOT APPLICABLE				0.008	NOT APPLICABLE				15
14	0.010	100	0.010	NOT APPLICABLE				0.010	NOT APPLICABLE				10
15	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				0
16	0.012	100	0.012	NOT APPLICABLE				0.012	NOT APPLICABLE				15
17	0.008	100	0.008	NOT APPLICABLE				0.008	NOT APPLICABLE				15
18	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				0
19	0.010	100	0.010	NOT APPLICABLE				0.010	NOT APPLICABLE				10
20	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				0
21	0.012	100	0.012	NOT APPLICABLE				0.012	NOT APPLICABLE				17
22	0.007	100	0.007	NOT APPLICABLE				0.007	NOT APPLICABLE				12
23	0.008	100	0.008	NOT APPLICABLE				0.008	NOT APPLICABLE				15
24	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				13
25	0.002	100	0.002	NOT APPLICABLE				0.002	NOT APPLICABLE				10
26	0.000	0	0.000	NOT APPLICABLE				0.000	NOT APPLICABLE				4
27	0.007	100	0.007	NOT APPLICABLE				0.007	NOT APPLICABLE				13
28	0.010	100	0.010	NOT APPLICABLE				0.010	NOT APPLICABLE				11
29	0.012	100	0.012	NOT APPLICABLE				0.012	NOT APPLICABLE				12
30	0.012	100	0.012	NOT APPLICABLE				0.012	NOT APPLICABLE				22
31	0.012	100	0.012	NOT APPLICABLE				0.012	NOT APPLICABLE				22
SUM	0.187	-	0.187	N.A.	N.A.	N.A.	N.A.	0.187	N.A.	-	-	376	
AVG	0.006	100	0.006	N.A.	N.A.	N.A.	N.A.	0.006	N.A.	70	128	12	
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308	

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEMSITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR. OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	73
2	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	74	73
3	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	76	78
4	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	78	80
5	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	78	79
6	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	73
7	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	74
8	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	75
9	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	75
10	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	79
11	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	79	80
12	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	80	80
13	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	77
14	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	76
15	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	75
16	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	74	72
17	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	73	72
18	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	72	75
19	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	78
20	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	81
21	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	78
22	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	80
23	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	76	74
24	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	74	74
25	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	71	69
26	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	71	74
27	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	78
28	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	76	79
29	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	75	79
30	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	83
31	0.000	0	0.000	0.000	NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE	0.000	NOT APPLICABLE	77	83
SUM	0.000	-	0.000	0.000	N.A.	N.A.	N.A.	0.000	N.A.	-	-
AVG	0.000	0	0.000	0.000	N.A.	N.A.	N.A.	0.000	N.A.	76	77
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.

@ DENOTES NULL DATA.

N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT SPACE COOLING SUBSYSTEM

SITE: PEEDEY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MON.	SPACE COOLING LOAD MILLION BTU	SOLAR FR. OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG DRY BULB TEMP F	AMR TEMP DEG F
1	0.392	77	0.000	0.100	0.090	0.036		0.101		75	73
2	0.228	89	0.000	0.103	0.025	0.010		0.062		74	73
3	0.393	46	0.000	0.099	0.213	0.085		0.056		76	78
4	0.416	34	1.715	0.060	0.274	0.110		0.042		78	80
5	0.242	0	0.000	0.042	0.242	0.097		0.000		77	78
6	0.000	0	0.832	0.030	0.000	0.000		0.030		77	75
7	0.060	0	0.000	0.004	0.060	0.024		0.000		75	74
8	0.804	98	0.000	0.143	0.016	0.006		0.289		75	75
9	0.717	48	0.000	0.108	0.431	0.172		0.100		77	75
10	0.317	30	0.000	0.040	0.227	0.091		0.031		77	78
11	0.345	0	1.152	0.088	0.382	0.153		0.047		79	80
12	0.000	0	0.000	0.000	0.000	0.000		0.000		80	80
13	0.000	0	1.523	0.014	0.000	0.000		0.143		75	77
14	0.713	100	0.000	0.131	0.018	0.007		0.236		75	76
15	0.143	87	0.000	0.063	0.019	0.008		0.036		75	75
16	0.352	95	1.580	0.236	0.445	0.178		0.159		74	72
17	0.930	52	0.366	0.158	0.199	0.080		0.094		72	74
18	0.700	7	1.234	0.254	0.000	0.000		0.000		75	75
19	0.000	0	1.000	0.000	0.000	0.000		0.000		77	78
20	0.000	100	0.959	0.000	0.000	0.000		0.141		77	81
21	0.589	30	0.901	0.217	0.745	0.298		0.024		78	80
22	1.071	31	0.000	0.238	0.818	0.327		0.137		76	73
23	1.185	23	0.000	0.137	0.580	0.232		0.072		74	74
24	0.780	0	1.249	0.095	0.560	0.224		0.157		71	69
25	0.827	0	1.259	0.240	0.000	0.000		0.013		71	74
26	0.000	0	1.000	0.137	0.000	0.000		0.100		77	78
27	0.000	0	0.000	0.000	0.000	0.000		0.000		77	79
28	0.000	0	0.000	0.000	0.000	0.000		0.000		76	79
29	0.909	100	2.284	0.400	0.000	0.000		0.044		77	83
30	0.837	74	0.811	0.215	0.218	0.087		0.121		77	
31	0.774	60	0.736	0.191	0.312	0.125		0.068		77	
SUM	14.024	-	17.602	3.636	5.876	2.350	N.A.	1.530	N.A.	-	-
AVG	0.452	58	0.568	0.117	0.189	0.076	N.A.	0.049	N.A.	76	77
NBS	Q502	N500	Q500	Q503	Q501		Q508	Q512	Q514	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT ENVIRONMENTAL SUMMARY

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

SOLAR/2018-79/05

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	1306	529	73	77	NOT	NOT	NOT
2	1897	615	73	78	NOT	NOT	NOT
3	1923	614	78	87	NOT	NOT	NOT
4	1988	482	80	88	NOT	NOT	NOT
5	1987	612	79	88	NOT	NOT	NOT
6	1327	671	78	89	NOT	NOT	NOT
7	331	262	73	74	NOT	NOT	NOT
8	46	32	74	75	NOT	NOT	NOT
9	1179	553	75	85	NOT	NOT	NOT
10	1882	553	80	90	NOT	NOT	NOT
11	1757	484	79	88	NOT	NOT	NOT
12	1950	510	80	90	NOT	NOT	NOT
13	2031	501	80	90	NOT	NOT	NOT
14	1068	659	75	84	NOT	NOT	NOT
15	1788	563	77	85	NOT	NOT	NOT
16	2170	527	76	86	NOT	NOT	NOT
17	1977	670	75	82	NOT	NOT	NOT
18	2172	448	72	82	NOT	NOT	NOT
19	2409	208	74	84	NOT	NOT	NOT
20	1910	516	75	86	NOT	NOT	NOT
21	1701	644	78	88	NOT	NOT	NOT
22	2139	540	81	90	NOT	NOT	NOT
23	1837	617	80	88	NOT	NOT	NOT
24	528	364	73	74	NOT	NOT	NOT
25	2566	472	69	72	NOT	NOT	NOT
26	2501	167	74	76	NOT	NOT	NOT
27	2219	504	78	85	NOT	NOT	NOT
28	2325	405	78	88	NOT	NOT	NOT
29	1829	626	79	90	NOT	NOT	NOT
30	1853	310	79	93	NOT	NOT	NOT
31	2068	402	83	92	NOT	NOT	NOT
SUM	53371	15060	-	-	-	-	-
AVG	1722	486	77	85	N.A.	N.A.	N.A.
NBS ID	9001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT THERMODYNAMIC CONVERSION EQUIPMENT

SOLAR/2018-79/05

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE NOTE)
1	0.000	0.000	0.000	-0.014	0.000
2	0.000	0.000	0.000	0.000	0.000
3	0.000	0.000	0.000	0.000	0.000
4	0.087	1.715	0.008	2.366	0.156
5	0.000	0.000	0.000	0.000	0.000
6	0.268	0.832	0.030	0.924	0.323
7	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000
9	0.000	0.000	0.000	0.000	0.000
10	0.006	0.000	0.000	0.000	0.000
11	0.064	1.152	0.009	1.460	0.243
12	0.006	1.523	0.000	0.000	0.000
13	0.107	1.523	0.014	1.873	0.374
14	0.000	0.000	0.000	0.000	0.000
15	0.000	0.000	0.000	0.000	0.000
16	0.914	1.580	0.155	2.692	0.578
17	0.000	0.000	0.000	0.000	0.000
18	0.827	0.000	0.117	0.000	0.000
19	0.618	1.366	0.094	2.363	0.605
20	0.000	1.234	0.000	2.020	0.501
21	0.514	0.000	0.102	0.000	0.000
22	0.509	0.901	0.093	1.569	0.536
23	0.000	0.000	0.000	1.490	0.565
24	0.000	0.000	0.000	0.000	0.000
25	0.695	1.249	0.104	0.000	0.000
26	0.630	1.259	0.137	2.104	0.556
27	0.000	0.000	0.000	1.971	0.501
28	0.000	0.000	0.000	0.000	0.000
29	1.107	2.284	0.290	0.000	0.000
30	0.445	0.811	0.109	3.490	0.485
31	0.413	0.736	0.105	1.347	0.549
SUM	7.214	17.602	1.370	26.871	0.504
AVG	0.233	0.568	0.044	0.867	0.016

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.
NOTE:

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT AUXILIARY STORAGE PERFORMANCE

SOLAR/2018-79/05

SITE: REEDY CREEK
REPORT PERIOD: MAY, 1979

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	INCREASE IN STORAGE MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	0.302	0.000	0.269	62	1.000
2	0.202	0.000	0.198	65	1.000
3	0.181	0.000	0.153	67	1.000
4	0.142	0.087	-0.153	64	1.269
5	0.000	0.000	-0.840	58	1.000
6	0.000	0.268	-0.037	56	2.297
7	0.000	0.002	-0.616	52	-104.561
8	0.788	0.000	0.216	57	1.000
9	0.285	0.000	0.486	61	1.000
10	0.090	0.006	0.172	65	-37.666
11	0.163	0.064	0.327	64	17.843
12	0.000	0.006	-0.407	60	17.420
13	0.000	0.107	-0.108	55	1.000
14	0.713	0.000	-0.792	55	1.000
15	0.126	0.000	0.842	61	1.000
16	0.333	0.914	-0.168	59	0.795
17	0.486	0.000	0.393	60	1.000
18	0.500	0.000	-0.444	56	0.998
19	0.000	0.827	-0.325	61	1.021
20	0.000	0.618	-0.631	55	1.000
21	0.689	0.514	0.026	55	0.330
22	0.326	0.509	0.519	58	0.941
23	0.367	0.000	-0.153	57	1.000
24	0.200	0.000	0.284	60	1.000
25	0.266	0.695	-0.418	54	0.985
26	0.000	0.630	-0.630	49	1.000
27	0.000	0.000	-0.661	50	1.000
28	0.000	0.000	0.019	49	1.000
29	0.909	1.107	0.082	50	0.544
30	0.618	0.445	0.306	57	0.742
31	0.462	0.413	-0.067	57	1.283
SUM	8.148	7.214	-0.359	-	-
AVG	0.263	0.233	-0.012	58	1.179

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

UNIVERSITY OF FLORIDA



3 1262 09052 5782